Specification

1. Title of the Utility Model

[handwritten]*One character revised*

STEERING DEVICE FOR TOY AUTOMOBILE

2. Utility Model Claim

A steering device for a toy automobile, comprising left and right brackets mounted so that they can rotate around a vertical axis line and to move up and down along the vertical axis line on the left and right side end portions of a chassis, steering wheels mounted so that they can rotate on respective wheel shafts provided in a protruding condition at a right angle to the aforesaid vertical axis on the left and right brackets, steering drive means which is connected to a tie rod connecting said left and right brackets for turning the steering wheels to the left and to the right from the neutral position, and a member connected to said left and right bracket so as to suppress the upward movement thereof and serving to cause the left and right steering wheel to execute a sea-saw movement when the toy automobile drives with a turn to the left or to the right.

3. Detailed Description of the Utility Model

(Field of the Invention)

The present utility model relates to a steering device of a radio controlled toy automobile.

(Description of the Related Technology)

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Examples of the conventional steering devices for the aforesaid toy automobiles are described in Japanese Patent Application Laid-open No. 54-13026 and an Examined Japanese Utility Model Application 60-36319.

FIGS. 5 and 6 are respectively the plan view and the front view of the conventional steering devices for toy automobiles of this type.

Referring to the figures, pin holes 2, 3 are provided respectively in the left and right end sides in the front part of chassis 1. Lower end portions of the left and right brackets 4. 5 for steering wheel support are fitted into the respective pin holes 2, 3 so that those lower end portions can rotate in a horizontal direction. The upper end portions of the brackets 4, 5 are engaged with the pivot receiving portion 6a, 6b of the pressing plate 6. Because the pressing plate 6 is tightened with tapping screws 8, 8 to the support columns 7, 7 provided in the protruding condition on the chassis 1, the brackets 4, 5 can rotate to the left and to the right, but cannot move in a vertical direction. Furthermore, in the intermediate portion of the left and right brackets 4, 5, wheel shafts 9, 10 are fixed so as to protrude outwardly from the chassis at a right angle to the rotary shaft line of the brackets,

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and stirring wheels 11, 12 are rotatably mounted on the wheel shafts 9. 10. respectively. Furthermore, projections 13, 14 are provided at the left and right brackets 4. 5. The two ends of a tie rod 15 are rotatably connected to those projections 13, 14 and a drive unit for steering (not shown in the figures) is linked to the tie rod 15. The steering wheels 11. 12 are caused to change direction to the left and to the right from the neutral state by operating the drive unit via radio control.

(Problems Addressed by the Invention)

In the steering device of the above-described conventional toy automobiles. the brackets 4, 5 for supporting the steering wheels are supported so that they can be rotated to the left and to the right. However, because the structure does not allow them to move in the vertical direction. if strains caused by thermal shrinkage after molding are induced in the chassis 1 which is a resin molding, or an error is made in molding or assembling the brackets 4, 5, a difference occurs between the contact pressures of the left and right steering wheels 11, 12 with respect to a floor surface. As a result, when the steering wheel with a large contact pressure with the floor surface is on the outer side of the driving curve and the toy automobile is caused to move forward and to

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the left or forward and to the right, and also when the steering wheel with a small contact pressure with the floor surface is on the outer side of the driving curve and the toy automobile is caused to move forward and to the left or forward and to the right, the driving curve has a smaller radius in the former case than in the latter case. As a result, there was a difference between the two cases, and in addition the toy automobile tended to deviate from the straight course by turning to the left or to the right even when it was driven straight forward.

Furthermore, even if the contact pressure of the left and right steering wheels 11, 12 with respect to the floor surface is adjusted so as to be the same, because the drive wheels are not provided with a differential mechanism such as in passenger automobiles, the steering radius required for turning left or turning right was large and sharp turning was impossible.

It is an object of the present utility model to resolve the above-described problems and to provide a steering device for a toy automobile in which equal contact pressure of the left and right steering wheel against the floor surface can be maintained even when thermal deformation and strain occur in the chassis and which can turn sharply and move without deviation.

(Means to Resolve the Problems)

The steering device for a toy automobile in accordance with the present utility model

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comprises left and right brackets mounted so that they can rotate around a vertical axis line and to move up and down along the vertical axis line on the left and right side end portions of a chassis, steering wheels mounted so that they can rotate on respective wheel shafts provided in a protruding condition at a right angle to the aforesaid vertical axis on the left and right brackets. steering drive means which is connected to a tie rod connecting the left and right brackets for turning the steering wheels to the left and to the right from the neutral position. and a member connected to the left and right bracket so as to suppress the upward movement thereof and serving to cause the left and right steering wheel to execute a sea-saw movement when the toy automobile drives with a turn to the left or to the right.

(Operation)

With the steering device for a toy automobile in accordance with the present utility model, when the toy automobile is driven with a turn to the right or to the left, the see-saw member that is designed so as to suppress the upward movement of the brackets causes one steering wheel to move up or down according to the turn to the left or to the right and at the same time causes the other steering wheel to move in the opposite direction, that is, down or up, thereby generating a difference in the contact pressure with respect to the driving floor surface between the left and right drive wheels. As a result, the direction change radius during right-turn or left-turn

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movement of the toy automobile is decreased, the toy automobile can easily turn sharply, and the contact pressure of the left and right steering wheels with respect to the floor surface is made uniform by a see-saw support of the left and right steering wheels.

(Embodiments)

The embodiments of the present utility model will be explained hereinbelow in greater detail with reference to the appended drawings.

In FIGS. 1 through 4, the reference symbol 20 stands for the chassis of a toy automobile, pin holes 21, 22 are provided respectively in the left and right end sides in the front part of the chassis 20. Lower end pivot pins 23a, 24a of the brackets 23, 24 for steering wheel support are fit into the respective pin holes 21, 22 so that those lower end pivot pins can rotate around a vertical axis and also can move in the up-down direction. The left and right brackets 23, 24 comprise respective wheel shafts 25, 26 provided in a protruding condition at a right angle toward the outside of the chassis from the intermediate parts of the brackets, and steering wheels 27, 28 corresponding to front wheels of the toy automobile are rotatably supported on those wheel shafts 25, 26. The reference symbol 29 stands for a support member in the form of a short stripe for supporting the upper end portions of the left and right brackets 23, 24 so that they can rotate and move in the vertical direction. This support member 29 is fixed horizontally by tightening

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with the tapping screws 31, 31 to support columns 30, 30 provided in a protruding condition vertically on the chassis 20. Pin holes 29a, 29b are provided in both end portions of the support member 29, and the upper pivot pings 23b, 24b of the brackets 23, 24 are fit into those pin holes 29a, 29b, thereby supporting the brackets 23, 24 on the chassis so that they can rotate and move in the vertical direction.

The brackets 23, 24 comprise protrusions 32, 33 protruding horizontally toward the front end of the chassis 20. The two ends of the tie rod 34 are rotatably connected to the two protrusions 32, 33, and the intermediate portion of the tie rod 34 is connected to the radio-controlled steering drive unit 35. The reference symbol 36 stands for a see-saw member for causing the steering wheels 27, 28 (including the left and right brackets 23, 24) to executed a see-saw movement in response to the left-turn and right-turn driving. This see-saw member 36 is composed of a short stripe-like member made of a synthetic resin and is arranged above the support member 29 in the longitudinal direction thereof. A support shaft 37 is supported at a right angle to the horizontal direction in the intermediate portion of the see-saw member 36.

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The two ends of the support shaft 37 are engaged with the loop-like receiving portions 38a, 38b provided in a protruding condition on the support member 29. As a result, the sea-saw member 36 can be turned in the up-down direction around the support shaft 37. Furthermore, the lower surface of the two end portions of the sea-saw member 36 is abutted against the distal ends of the upper pivot pins 23b, 24b of the left and right bracket 23, 24, thereby preventing the upward movement of the brackets 23, 24.

In FIG. 1, the reference symbol 38 stands for a small motor for driving which is capable of rotating in two directions, this motor being disposed at the rear end portion of the chassis 20. Rear wheels, that is, left and right drive wheels 40, 41 are fixed to the two ends of the drive shaft 39 rotated by the small motor 38.

The operation of the present embodiment having the above-described configuration will be described hereinbelow.

If a stick (not shown in the figures) for forward and rearward movement, which is provided at a transmitter (not shown in the figures), is operated forward or rearward, a forward or rearward command signal is transmitted from the transmitter. If the transmitted signal from the transmitter is received by a receiver (not shown in the figures) carried on the chassis 20 of the toy automobile, the signal received by the receiver is analyzed, and if the analyzed signal

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represents a forward or rearward movement command, this forward or rearward command is outputted to a control circuit (not shown in the figures) of the small motor 38 for driving. the small motor 38 is actuated, and the toy automobile is caused to move forward or rearward.

If the steering stick (not shown in the figures) of the transmitter is operated in this state in the left-turn direction or right-turn direction, the command signal corresponding to the left turn or right turn is transmitted from the transmitter. If the transmitted signal is received by the receiver of the automobile toy, the receiver analyzes whether the received signal is a left turn signal or a right turn signal, and outputs the left-turn command signal or right-turn command signal to a control circuit (not shown in the figures) of the steering drive unit 35, thereby causing the steering drive unit 35 to execute a left-turn or right-turn operation. Thus, if the steering drive unit 35 executes a left-turn operation, the brackets 23, 24 connected via the tie rod 34 are turned leftward, the steering wheels 27, 28 are turned through the prescribed angle to the left from the neutral position and the toy automobile it turned left. Further, if the steering drive unit 35 executes a right-turn operation, the steering wheels 27, 28 are turned through the prescribed angle to the right from the neutral position and the toy automobile it turned right.

When the toy automobile is turned left or right and moves, for example, in a forward right-turn mode, because the steering wheels 27, 28 of the toy automobile are turned through the prescribed angle in the rightward direction, as shown in FIG. 4(a), an additional load is applied to the left steering wheel 27 by the centrifugal action produced when the toy automobile it to make the right turn. Accordingly, as shown in FIG. 4(b), the bracket 23 located on the left side moves up with respect to the chassis 20 and, at the same time, the right bracket 34 connected thereto with the see-saw member 36 moves down with respect to the chassis 20. Further, as the toy automobile is driven to the right, a centrifugal force equivalent to shaking to the outside acts upon the rear end portion. As a result, the right drive wheel 41 located on the inner side with respect to the right turning radius of the toy automobile starts slightly floating above the floor surface 42, whereas the left drive wheel 40 positioned on the outside with respect to the right turning radius is pressed strongly against the floor surface 42. As a result, a differential function similar to that in the passenger automobiles is realized between the left and right drive wheels 40, 41 fixed to the same drive shaft 39. As a result, the toy automobile can change the movement direction to the right at a right turn radius which is less than that in the conventional systems in

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which the brackets supporting the steering wheels could not move in the vertical direction.

Furthermore, when the toy automobile moves forward and to the left or moves rearward and to the left or right, the change of movement is identical to the aforesaid change relating to the movement forward and to the right.

Therefore, in the above-described present embodiment, because the left and right steering wheels 27, 28 can move in the vertical direction with respect to the chassis 20, and can executed a see-saw movement under the effect of the sea-saw member 36, the direction change radius during left or right turn driving of the toy automobile can be decreased and the automobile can make a sharp turn. At the same time, because the left and right steering wheels can execute the see-saw movement under the effect of the see-saw member, the left and right steering wheels 27, 28 can be pressed against the floor surface with an equal contact pressure even when strains have occurred in the chassis 20, or there was an error in processing of the steering wheels and brackets, or they were mounted with an error. Furthermore, when the steering wheels are maintained in a neutral state, the deviation thereof along the curve to the left or right can be prevented. In addition, if the see-saw member 36 is provided with elasticity, the aforesaid deviation can be completely eliminated and it is unnecessary to pay utmost attention to the molding and assembly

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accuracy of the steering wheels or brackets for supporting the wheels.

Further, the mechanism for supporting the brackets for supporting the steering wheels and moving them in the vertical direction and the see-saw mechanism thereof which are employed in accordance with the present utility model are not limited to those indicated in the aforesaid embodiment.

(Effect of the Utility Model)

As described hereinabove, in accordance with the present utility model, the left and right steering wheels are supported on a chassis with the bracket so that they can change the direction thereof to the left and right and also so that they can move in the vertical direction. Furthermore, the steering wheels can execute a see-saw motion during right-turn and left-turn movement under the effect of a see-saw member. Therefore, a toy automobile can be provided in which the radius with which the toy automobile changes movement to the right and left can be decrease, the driving mechanism is capable of sharply turning the automobile, the same contact pressure with respect to the floor surface can be obtained for the left and right steering wheel, and deviation during movement is prevented.

4. Brief Description of the Drawings

FIG. 1 is a plan view illustrating part of a steering device for a toy automobile relating to the present utility model. FIG. 2 is a right side view of the part shown in FIG. 1. FIG. 3 is an exploded perspective view of a steering mechanism in the present embodiment. FIG. 4(a), (b) is [seal]

an explanatory drawing relating to the present embodiment. FIG. 5 is a plan view of the conventional steering device for toy automobile. FIG. 6 is a right side view thereof.

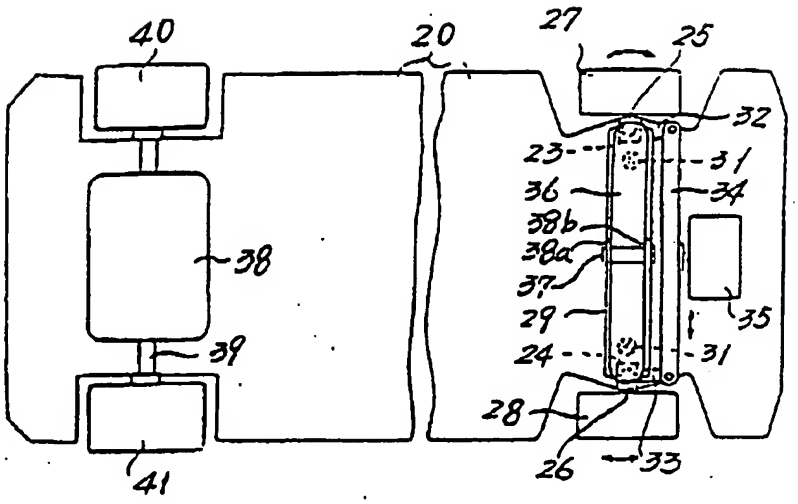
(Keys)

20 - chassis, 21, 22 - pin holes, 23, 24 - brackets, 27, 28 - steering wheels, 29 - support member, 34 - tie rod, 35 - steering drive unit, 36 - see-saw member, 38 - small motor for driving, 40, 41 - drive wheels.

Applicant

Patent Representative. Patent Attorney: M. Monma [seal of Monma]

第1図



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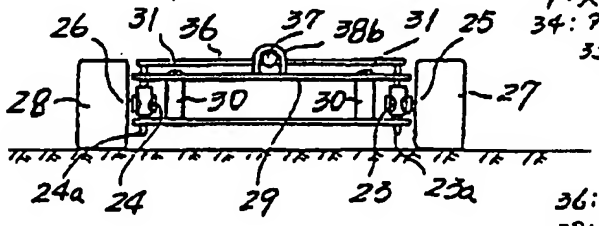
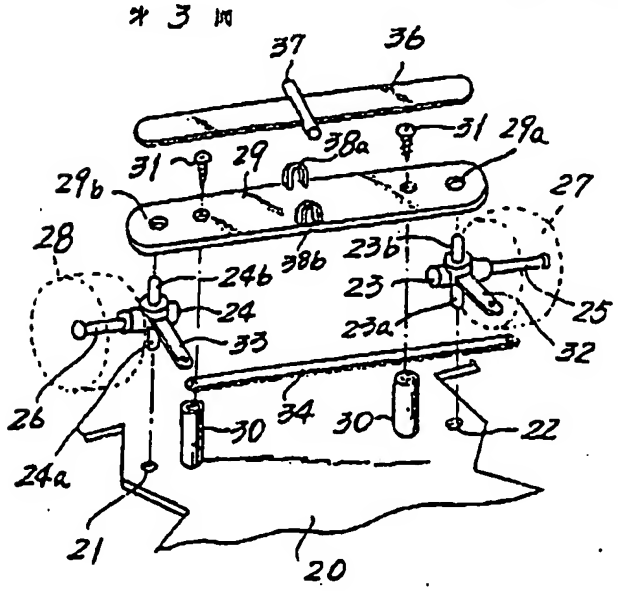
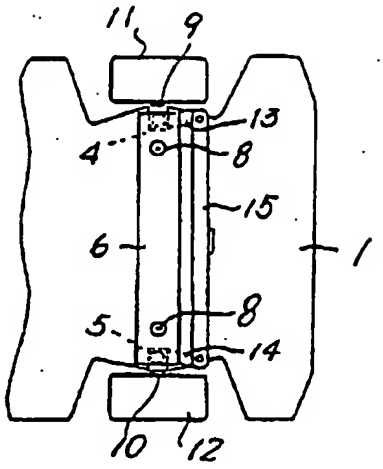


20：シャーシ
23,24：ブラケット
27,28：操向輪
29：支持部材
34：アイロッド
35：自己調心軸受
36：シーソー部材
38：走行用小型モータ
40,41：駆動輪

第3図



第5図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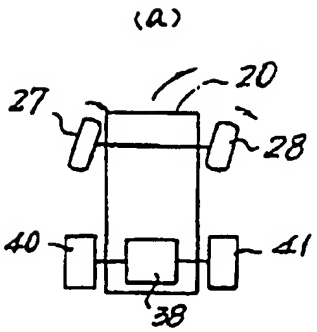
(a)
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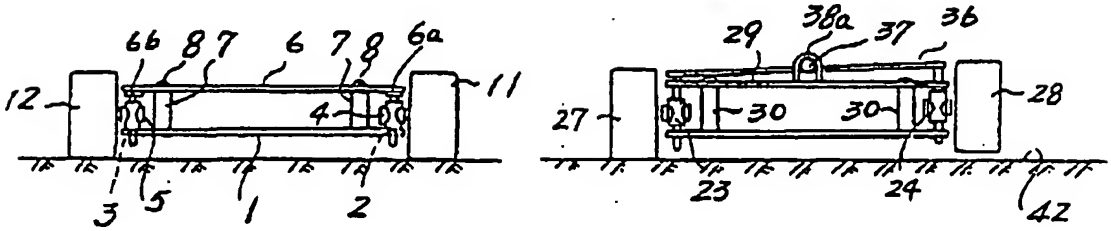
第6図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